DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About the image display device in the computer which displays image data, this invention has very flexible how to read the data for a display from the memory in a graphic display system, as for the invention in this application, makes every pixel the smallest unit of the pixel data read in case the data for a display are read from memory, and relates to the system which can be defined dynamically.
[0002]
[Description of the Prior Art] If it puts on a common computer conventionally, a direct main processor or drawing equipment calculates and compounds the superposition of an indicative data, and synthetic processing on the memory on a single frame memory.
[0003] Drawing 17 is the block diagram showing an example of the conventional image display device. This image display device is a configuration which consists of Maine CPU 101, main memory 102, the data-processing circuit 103, the Rhine memory 104, the output-processing circuit 105, a system controller 106, and a synchronizing signal generation circuit 107.
[0004] Some indicative datas are stored in main memory 102. For example, considering the case where some kinds are displayed on a window, the indicative data corresponding to each window is stored.
[0005] When piling up this window and making it display on one screen, Maine CPU 101 chooses and reads each indicative data, and the indicative data of one screen is again stored in main memory 102 so that it may become one screen display.
[0006] According to the timing of the synchronizing signal generated in the synchronizing signal generation circuit 107, a system controller 106 generates the address of main memory 102 to data transfer. According to this address, an indicative data is read from main memory 102, and after being decided beforehand and performing data processing in the data-processing circuit 103, data are transmitted to the Rhine memory 104.
[0007] The data from the Rhine memory 104 are outputted according to the timing of a synchronizing signal, perform processing for a display by the output circuit 105, and display it on a display.
[0008] Moreover, the frame memory for number of sheets required for superposition is prepared, and there is a system which reads data from all frame memories at the time of a video output, and displays a synthetic result on it based on each inter-frame priority as indicated by JP,6-149527,A.
[0009] Moreover, there is a system which identifies in what kind of the mode (for example, number of bits which is 1 pixel) each display dot is now by preparing discernment memory for every display dot of the memory of a viewing area apart from the memory for a display, displays according to the mode, and displays a different display mode on one screen as indicated by JP,6-295169,A.
[0010] Moreover, as it is also in said patent, when the information in each window used mask memory and it is being displayed separately that the contents of discernment memory are referred to or indicates to JP,7-33434,A is changed and it relacks, there is a system which carries out the mask of the outside of the field.

[0011]
[Problem(s) to be Solved by the Invention] however, by the approach of mitigating the processing load of software by realizing superposition of each window like before by having a frame memory for number of sheets required for superposition Since a frame memory is needed with the maximum size of display area regardless of the size of the window which opens the frame memory for the maximum number of sheets considered to be the need by the system from the start, Since it is necessary to read data from all the frame memories corresponding to the window to coincidence when the use effectiveness of memory turns very bad up and many windows are opened to coincidence, (Since it is necessary to also read the data of a part which the window has lapped and is not displayed in practice) In proportion to the number of sheets of the window to open, power consumption will become large.
[0012] Moreover, since several bits discernment memory is needed separately to the memory for a full screen considering as the approach of indicating the display mode which is different on one screen like the former by mixture, and preparing discernment memory for every display dot of the memory of a viewing area by the approach of identifying in what kind of the mode each display dot being now, the memory (discernment memory) which cannot be diverted to another application is needed for an excess.
[0013] This can say the same thing, also when using mask memory.
[0014] In order that the purpose of this invention may distinguish and display the indicative-data format etc. on each window (indicative-data lump with semantics) of every, The mask memory for the light mask at the time of displaying the excessive discernment memory and the excessive window for distinguishing a display mode in piles can be lost. Since the display information on each window can contain the indicative data displayed on the location of the arbitration on memory in the window, There is no need of taking data other than a part required for a display in order to be able to lose useless room and to take the window data on memory only from a part required for a display. Since the count of memory bus access for a display can be pressed down to the minimum, Since the rate of access to the memory of a main processor can be improved, useless power consumption can be cut down and a display gestalt is not restricted by the configuration of a frame memory, it is offering the system which can perform a free display configuration in construction.
[0015]
[Means for Solving the Problem] In order to solve an above-mentioned technical problem, this invention is characterized by having the following means.
[0016] In the image display device which has at least two or more alignment systems in claim 1 At least two or more alignment systems for carrying out coincidence reception of the picture signal from the source of two or more signals, and one alignment system Signal contraction / expanding means which reduces / elongates each video signal in order to consider as the alignment system for the Maine screens, to use other alignment systems as the alignment system for sub screens and to display two or more images on a scope at coincidence, With the signal mixing means and said mixing means for superimposing all or a part and displaying the video signal from the alignment system for the Maine screens, and the video signal from the alignment system for sub screens As opposed to the field of the video signal for [which is superimposed and displayed] having been detected by a detection means to detect the field of the video signal on which it was superimposed, and said detection means A means to set up whether the mixed ratio which was able to decide beforehand the mixed ratio of the video signal on which it superimposes each other to be a setting means to set up whether which video signal is carried out up and down, and the mixed ratio of arbitration is set up, or it carries out continuously and displays, It has the display which projects two or more video signals controlled by said display processor.
[0017] In the image display device which has at least two or more alignment systems in claim 2 At least two or more alignment systems for carrying out coincidence reception of the picture signal from the source of two or more signals, and one alignment system Signal contraction / expanding means which reduces / elongates each video signal in order to consider as the alignment system for the Maine screens, to use other alignment systems as the alignment system for sub screens and to display two or more images on a scope at coincidence, With the signal mixing means and said mixing means for

superimposing all or a part and displaying the video signal from the alignment system for the Maine screens, and the video signal from the alignment system for sub screens As opposed to the field of the video signal for [which is superimposed and displayed] having been detected by a detection means to detect the field of the video signal on which it was superimposed, and said detection means A means to set up whether the mixed ratio which was able to decide beforehand the mixed ratio of the video signal on which it superimposes each other to be a setting means to set up whether which video signal is carried out up and down, and the mixed ratio of arbitration is set up, or it carries out continuously and displays, The means which writes the call address in the Rhine memory per pixel together in case an indicative data is written in the Rhine memory, Or it has the display which projects two or more video signals which were supplied from the means which writes a direct mixing ratio in the Rhine memory per pixel, and said write-in means, and were controlled by said display processor.

[0018]

[Embodiment of the Invention] Drawing 18 is the block diagram showing a graphic display system for the foundation and **** of this invention.

[0019] How to read the data for a display from memory is very flexible, and it is the application function to which this invention used this technique as the base about the system which makes every pixel the smallest unit of the pixel data read in case the data for a display are read from memory, and can be defined dynamically.

[0020] Explanation of operation is first given about this base technique.

[0021] The main memory which this indicating equipment is connected to the data bus (40) of a main processor (38), and memorizes a program, an indicative data, and other data (37), The Rhine memory for a video input (26) and (27) which memorize the digitized video image for every Rhine, The display processor 4 which interprets the instruction and data described by program memory 2 and data memory 3, and mainly performs a transfer of an indicative data etc. according to it, The YUV decoder 6 which performs YUV->RGB conversion to the indicative data sent from the display processor 4, The run length expansion circuit 7 which performs run TENGUSU expansion to this indicative data, The color expanding circuit 8 which elongates color data to this indicative data, Two or more color palettes 9 and 10 which perform pallet conversion to this indicative data, The selector 11 which chooses either from the indicative data by which a direct output is carried out from these data-conversion circuit section (36) and the display processor 4, Two or more Rhine memory (14) - which memorizes an indicative data and use Rhine information (25), The data buffer 13 which can mainly be used for storing of the pattern data of cursor etc., Two or more Rhine memory (14) selector [which chooses the Rhine memory of arbitration from - (25)] (28) - (30), The adder which adds the attenuator (31) to which the brightness of an indicative data is changed, (33), and its output in order to realize alpha blending (see-through function) (32), The selector used for composition of repeat background data, cursor, etc. (34), It consists of a D/A converter (35) which performs D/A conversion in order to display on a display, and a selector 12 used when the display processor 4 reads the data of data buffer (13) and Rhine memory (14) - (25).

[0022] Although the UMA (Unified Memory Architecture) configuration which it does not have [configuration] the frame buffer of dedication but makes an indicative data live together in main memory (37) is taken in this example, you may become the configuration which has the frame buffer of dedication apart from main memory (37).

[0023] Hereafter, actuation of the example of this invention is explained.

[0024] First, rough flow until an indicative data is actually displayed is explained below. The data to display are mainly stored in main memory (37) and a data buffer 13.

[0025] These indicative datas are read by the display processor 4, and are temporarily stored in the buffer memory for a transfer inside the display processor 4 (5), and (41). Then, it is stored in Rhine memory (14) - (25), after operating zooming, a skip, etc. and being changed into the data of a simple RGB format through the data-conversion circuit section (36).

[0026] Rhine memory (14) While an effective invalid is judged by the use Rhine information (14) in Rhine memory (14) - (25), (16), (18), (20), (22), and (24), every 1 pixel in all of data written in - (25) is read to a dot clock.

[0027] It is repeatedly compounded by alpha blending of two screens, and the selector (34) with background data, cursor, etc. with an attenuator (31), (33), and an adder (32), and after passing D/A (35), it is outputted and displayed on a display with a synchronizing signal etc. The above is the rough flow to a display.
[0028] Control of most part of a display is performed by the display processor (4) in this display. The display processor (4) has the program memory 2 and data memory 3 of dedication, interprets the program and data which are stored in it, and performs a transfer of an indicative data etc. according to it. A program and data are directly written in by the main processor (38), or are transmitted by the display processor (4) from main memory (37).
[0029] A display processor (4) can read data, such as main memory, into own program memory 2 and data memory 3, while performing a program. Moreover, actuation of a display processor (4) was decided, and when modification is unnecessary, ROM is sufficient as a part of program memory 2 or data memory 3.
[0030] Next, the case where two or more windows etc. are compounded and displayed is explained.
[0031] Although the indicative data in main memory (37) was read in an order from the start address and was only displayed in the display of a solid screen, that from which only the number of arbitration took out the data of the location of the arbitration of main memory (37) depending on the program given to a display processor (4) can be displayed in the combination of arbitration. For example, in the case of a window system, the indicative data of two or more windows is stored on main memory (37) in the form completed by the respectively different address, and according to the location and priority of each window, in case it displays, it can pile up and display on real time.
[0032] Next, other actuation which a display processor (4) performs is explained.
[0033] Processing of zooming and a skip of an indicative data is explained first. The display processor (4) has the buffer memory for a transfer (5), and 2 sets of (41) in the interior, and after the indicative data read from main memory (37) is first stored in the buffer memory for the 1st set of transfers (5) and then is stored in 1 more set of buffer memory for a transfer (41), it is stored in Rhine memory [for a display] (14) - (25).
[0034] Read-out and the writing between this buffer memory for a transfer (5) and (41) are finely controllable by the program given to a display processor (4).
[0035] concrete -- the 1st set of stops of the read-out counter of the buffer memory for a transfer (5) and (calling it read-out memory) -- the writing to the stop of the write-in counter of the buffer memory for a transfer of a lot (41) and (calling it write-in memory) and write-in memory already carries out -- it can /carry out and **** can be performed per pixel in the location of arbitration.
[0036] It can be made to change to the indicative data which made by this the expression (it is called the skip) and them to which it seems that the image expansion of a display image, contraction, and on the right of a certain location shifted rightward, and the hole opened in the image intermingled.
[0037] Next, the data-conversion circuit section (36) is explained. The indicative data stored in main memory (37) is stored not only in the data of the usual RGB format but in various data format.
[0038] While an indicative data is read from main memory (37) by the display processor (4) and being written in Rhine memory (14) - (25), there are data-conversion circuits, such as the YUV decoder 6, the run length expansion circuit 7, the color expanding circuit 8, and color palettes 9 and 10, and the indicative data of various data format is changed into a RGB format there, and it is stored in Rhine memory (14) - (25).
[0039] It is specified by the display processor (4) per pixel by which data-conversion circuit it changes. The pallet which can have two or more color palettes 9 and 10, for example, is used for every window is changeable.
[0040] Furthermore, it can respond to a format of various indicative datas by adding other data-conversion circuits. In addition, as for the color expanding circuit 8, the detail is described to JP,7-336727,A.
[0041] Although the indicative data which passed the data-conversion circuit section (36) is written in Rhine memory (14) - (25), some values can be set up as write-through data which are not displayed in

fact among indicative datas.
[0042] main memory (37) and data buffer from -- if there are write-through data in case a display processor (4) transmits an indicative data to Rhine memory (14) - (25), about the pixel, the writing to Rhine memory (14) - (25) will not be performed.
[0043] This is effective in the display of the image which is not a rectangle, for example, a mouse cursor etc.
[0044] Next, the repeat display of the same pattern is explained. Although it often sees on the background screen of a windowing system etc., the horizontally same pattern is sometimes often displayed repeatedly.
[0045] In this case, when a specific pattern can be repeated and displayed because it can be made to carry out the loop formation of the readout address read from Rhine memory (14) - (25) in the range of arbitration, and especially this stores background data in main memory (37), the amount of data to read can be reduced and the traffic of the data bus (40) of a main processor (38) can be reduced.
[0046] In case this function is used, usual Rhine memory (14) memory [of the dedication which stores the pattern other than - (25) repeatedly / Rhine] (14) - (25) is 2 lot need. Therefore, Rhine memory (14) - (25) is needed at least six, when using 4 and alpha blending for coincidence at the lowest.
[0047] About eye N Rhine, when writing in - (25), the indicative data of a window and the use Rhine information N are written in Rhine memory (14) memory [which contains window data like usual first / Rhine] (14) - (25).
[0048] Next, the indicative data of a background and the use Rhine information N are written in Rhine memory (14) - (25) which contains background data, and the point is set up further repeatedly.
[0049] Some approaches can be considered for the setting approach of the repeat point, and how to prepare a specified register, to write in a value distinguishable from usual to the use Rhine information 14, 16, 18, 20, and 22 or an indicative data, or to prepare the Rhine memory of dedication can be considered.
[0050] It compares with a line number while displaying the use Rhine information 14, 16, 18, 20, and 22 on Rhine memory (14) - (25) which contains window data first in the case of a display.
[0051] If in agreement, the indicative data of a window is outputted, and background data will be outputted when not in agreement. Although background data are not illustrated, the background data shown by the internal background data read-out counter are outputted.
[0052] If the value of this read-out counter is repeatedly in agreement with the value of the point, the value of a read-out counter will be cleared. Return and background data are repeatedly outputted to the beginning of Rhine memory (14) - (25) to which the background data outputted by this contain background data in this range.
[0053] Next, actuation of the use Rhine information 14, 16, 18, 20, and 22 is explained.
[0054] Usually, the Rhine memory for a display (drawing 1 , Rhine memory 14-25) operates by 2 lots. This is because it cannot access by a display processor (4) writing in to Rhine memory (14) - (25) which is reading for the display, and writes the indicative data of next Rhine in different from - (25) another Rhine memory (14) memory [Rhine] (14) - (25) which is reading.
[0055] Rhine memory (14) - (25) which performs this reading and writing whenever Rhine to display changes is replaced by turns, and the display is advanced.
[0056] Next, the Rhine eye writes in the same Rhine memory (14) - (25) in order to use Rhine memory (14) - (25) alternately [2] (N+2). (N+2) There are two, a window 1 and a window 2, in the Rhine eye, and (N+2) is written in the indicative data and the use Rhine information 14, 16, 18, 20, and 22. This displays similarly.
[0057] Next (N+4), the Rhine eye is written in. (N+4) The Rhine eye writes (N+4) in an indicative data and the use Rhine information 14, 16, 18, 20, 22, and 24 only about a window 2.
[0058] The data of the window 1 written in by the Rhine eye at this time (N+2) remain remaining, when not performing a certain device, this will be displayed, and it becomes the wrong display.
[0059] However, in this example, since the use Rhine information 14, 16, 18, 20, and 22 on the part of this old window 1 is still (N+2), it is disregarded, and only a window 2 is displayed correctly.

[0060] Thus, although displayed about all Rhine, it is necessary to clear the use Rhine information 14, 16, 18, 20, and 22 on all Rhine memory (14) - (25) for every vertical-retrace-line period. This is for preventing displaying the indicative data of the last perpendicular display period.
[0061] In addition, a clearance is performed by writing in the value which is not used as use Rhine information.
[0062] Next, a data buffer 13 is explained. Although an indicative data is usually stored on main memory (37), the indicative data sizes, such as cursor, are small and it is decided that a pattern will be is good to store in a data buffer 13.
[0063] The indicative data stored in the data buffer 13 is chosen by the selector 12, and can be written in Rhine memory (14) - (25) by the display processor (4). Moreover, since it can also transmit to the program memory 2 and data memory 3 of the display processor (4) instead of Rhine memory (14) - (25), or main memory (37), the display of cursor etc. cannot be restricted but it can be used general-purpose.
[0064] Below, a drawing is used and explained about the operation gestalt of this invention.
[0065] Drawing 1 is the block diagram showing 1 operation gestalt of the programmable indicating equipment concerning this invention.
[0066] The data-processing section which performs processing whose indicating equipment of this changes into the data format of a display display the indicative data of main memory 112 and main memory 112 which memorizes Maine CPU 111, a program, an indicative data, and other data, the mixing ratio of the part with which a window 1 and a window 2 lap -- the processing for outputting the data-processing circuit 113 which consists of sum-of-products operation part which calculates about a rate (alpha blending section), the display memory section 114 which memorizes the indicative data by which transform processing was carried out, and an indicative data to a screen The output-processing circuit 117 to perform, The instruction and data memorized by DMA (Direct Memory Access)118 which performs the data access to main memory 112, program memory 119, data memory 120, and program memory 119 and data memory 120 are interpreted. It consists of a display processor 121 which mainly transmits an indicative data according to it, a synchronizing signal generation circuit 122, and video inputs 123 and 124.
[0067] YUV decoder 127a which performs YUV->RGB conversion to the indicative data sent from the display processor 121 as the data-processing circuit 113 is shown in drawing 2 , Run length expansion circuit 127b which performs run length expansion to this indicative data, Color expanding circuit 127c which elongates color data to this indicative data, It consists of two or more processing circuits of two or more color palettes 127d and 127e which perform pallet conversion to this indicative data, sum-of-products arithmetic circuits 127f and 127g which calculate two or more indicative datas to this indicative data, and a selector 128.
[0068] The display memory section 114 consists of a data buffer 115 which can be used for storing of the pattern data of cursor etc., and two or more Rhine memory 116 which memorizes data display data and use Rhine information, as shown in drawing 2 .
[0069] In order to display on the selector and display which are used for composition of an adder, repeat background data, cursor, etc. in order to add the attenuator to which the brightness of an indicative data is changed in order to realize the selector and alpha blending which choose the Rhine memory of arbitration from the output-processing circuit 117 and the Rhine memory 116 of ******, and its output, it consists of a D/A converter which performs D/A conversion.
[0070] The display processor 121 has the transfer buffer memory 125a, 125b, 126a, and 126b, as shown in drawing 3 .
[0071] This indicating equipment does not have the frame buffer of dedication, but although it takes in the UMA (Unified Memory Architecture) configuration which makes an indicative data live together to main memory 112, it may become the configuration which has the frame buffer of dedication in main memory 112.
[0072] Actuation of this operation gestalt is explained below.
[0073] First, the indicative data is mainly stored in main memory 112 by Maine CPU 111 which explains rough flow until an indicative data is actually displayed below.

[0074] These indicative datas are read by DMA118 and are temporarily stored in the buffer memory 125a and 125b for a transfer of the display processor 121 interior shown in drawing 3 .
[0075] Then, after operating zooming, a skip, etc. and being stored in the buffer memory 126a and 126b for a transfer, it is changed into the data of a simple RGB format by the data-conversion circuit 13, and is stored in the Rhine memory 116. Every 1 pixel in all of data written in the Rhine memory 116 is read to the dot clock of the synchronizing signal which the synchronizing signal generating circuit 122 generates.
[0076] It is compounded by the output-processing circuit 117 with alpha blending processing of two screens or repeat background data, cursor, etc., D/A conversion is carried out, and it is outputted and displayed on a display with a synchronizing signal etc. The above is the rough flow to a display.
[0077] Control of most part of a display is performed by the display processor 121 in this display.
[0078] The display processor 121 has the program memory 119 and data memory 120 of dedication, interprets the program and data which are stored in it, and performs a transfer of an indicative data etc. according to it. The information on program memory 119 and data memory 120 is transmitted from main memory 112 if needed.
[0079] According to a display configuration, modification of a graphic field, etc., two or more program/data are stored in main memory 112.
[0080] Next, the basic actuation of the display processor 121 when giving a program to the display processor 121 and performing a screen display is explained. Drawing 4 (A) - (C) is the explanatory view showing the indicative data of main memory 112, and the display output of a display.
[0081] The indicative data which has stored all in main memory 112 beforehand is stored in the Rhine memory 116. The case where the case where a solid screen is displayed, two or more windows, etc. are compounded and displayed is explained.
[0082] With the solid screen, as shown in drawing 4 (A), a background, cursor, a window, etc. are beforehand stored on main memory 112 as compounded solid screen data by Maine CPU 111.
[0083] It reads sequentially from the start address stored for displaying, and it transmits to the Rhine memory 116 and is made to display on it.
[0084] In the case of two (the case where alpha blending is not taken into consideration, and when alpha blending is taken into consideration like drawing 4 (C)), it divides like [composition of two or more windows etc.] drawing 4 (B).
[0085] Although only a front window is displayed, when alpha blending is specified, a front window is transparent and a back window can come to be seen [alpha blending is translucent composition, for example, / the part which lapped when usually becoming], when two windows lap.
[0086] Thus, the thing of the function which compounds and displays two or more indicative datas at a certain rate is said.
[0087] Moreover, although control of actuation of zooming and a skip, the data-conversion circuit section, use Rhine information, etc. is concerned with actuation of the display processor 121 in fact, about those actuation, it mentions later.
[0088] Next, the case where two or more windows etc. are compounded and displayed is explained.
[0089] Although the indicative data in main memory 112 was read in an order from the start address and was only displayed in the display of a solid screen, that from which only the number of arbitration took out the data of the location of the arbitration of main memory 112 depending on the program given to the display processor 121 can be displayed in the combination of arbitration.
[0090] For example, in the case of a window system, the indicative data of two or more windows is stored on main memory 112 in the form completed by the respectively different address, and according to the location and priority of each window, in case it displays, it can pile up and display on real time.
[0091] Here, like drawing 5 , as shown in a main memory map, it shall be stored in the address position of the arbitration on main memory 112 in the form where various indicative datas, such as background data, cursor data, window 1 data, window 2 even-number data, and window 2 odd-number data, were completed.
[0092] When it compounds among these indicative datas, only the data displayed are read and it

transmits to the Rhine memory.
[0093] Window 2 even-number data and window 2 odd-number data are the DS at the time of incorporating as even number data and odd number data for every field etc., when incorporating an INTARESU signal like an NTSC signal on main memory 112.
[0094] However, about the display of cursor, it mentions later.
[0095] Drawing 6 is a flow chart which gives a synthetic indication of two or more windows.
[0096] It is the actuation which reads only the data displayed when the various data of drawing 5 are compounded, and is displayed by one screen.
[0097] Since it is data of the arbitration which is not understood when indicative datas, such as a window coordinate and a priority, are changed, whenever it displays one screen, data transfer from the main memory 112 by the display processor 121 to data memory 120 is performed at step B1.
[0098] Moreover, in order to display one screen, the coordinate size yl of the direction of screen Y is acquired in step B-2, and the next level line number of a level line number current on display is acquired as line number L at step B3.
[0099] If it judges in step B4 whether it carries out alpha blending and it is not carried out alpha blending, the Rhine transfer (step B5) will usually be performed, and if it carries out alpha blending, alpha blending line transfer (step B6) will be performed.
[0100] next, processing of the weight for a synchronization (step B8) which controls the double writing to the Rhine memory if the coordinate size yl of line number L and the direction of screen Y displayed at step B7 is compared and the loop formation of yl time is not completed -- carrying out -- the above processing -- yl time -- one screen is displayed by carrying out.
[0101] Drawing 7 is the flow chart of the usual Rhine transfer without alpha blending. It is the memory map of the Rhine memory [in / drawing 8 (A), and / in (B) / line number L]. [the example of the display screen without alpha blending]
[0102] As line number L displayed on a degree in line number L of drawing 8 , the usual Rhine transfer on the line number is explained below. step C1 -- setting -- the boundary point of each indicative datas on line number L [the display processor 121] without alpha blending, and a point size -- computing .
[0103] The indicative data of each window is transmitted on data memory 120, and the boundary point and a point size are computed from an upper right coordinate, a lower left coordinate, the direction coordinate size of X, the direction coordinate size of Y, a priority, etc.
[0104] Or the data computed beforehand are transmitted to data memory 120 by Maine CPU 111, and you may acquire only by referring to data memory 120.
[0105] xpt[] ([] inside fills in the number which shows the order of an array), and a boundary point size are defined for the boundary point at this time as xpm.
[0106] As shown in drawing 8 (A), the boundary point on line number L is xpt[0] =xs0, xs1 and xpt[1] =xpt[2] = (xe 1+1), and xpt[3] = (xe 2+1) and xpt [4] = (xe 0+1).
A next door and the boundary point size xpm are set to 5.
[0107] By step C2, the boundary counter xp is cleared, the left boundary point xpl on Rhine L is acquired at step C3, and the nearest right boundary point xpr of the left boundary point is acquired at step C4. The indicative data between this xpl and xpr is distinguished, and indicative-data storing start-address addr which is equivalent to line number L at step C5 is acquired.
[0108] It is xpl=xpt[0] =xs0 at first, and since it is xpr=xpt[1] =xs1, this indicative data can distinguish that it is background data, and can compute background data storage start-address addr which is equivalent to line number L with addr=back_addr+xl*L+xs0.
[0109] Line number L judges even number or odd number at step C6, and data transfer (step C7) to Rhine memory 116a or data transfer (step C8) to Rhine memory 116b is changed.
[0110] Since display rectangles are xpl and (xpr-1), the data transfer size to Rhine memory 116a and Rhine memory 116b serves as xpr-xpl.
[0111] Since the write-in location to Rhine memory 116a or Rhine memory 116b is xpl, the data transfer to Rhine memory 116a or Rhine memory 116b will transmit the data of (xs1-xs0) to xs0 of Rhine memory 116a or Rhine memory 116b from addr.

[0112] Since the right boundary point xpr turns into the left boundary point xpl when transmitting the following xs1 and the data of a between (xe 1+1), the left boundary point xpl is acquirable by considering as xpl=xpr at step C9.
[0113] acquisition (step C4) of the already explained right boundary point xpr -- shifting -- these actuation -- xs1, (xe 1+1), (xe 1+1), (xe 2+1), and (xe 2+1) (xe 0+1),
By carrying out similarly between ******, data transfer of one line of line number L can be performed.
[0114] The comparison of the boundary count xp and the boundary point size xpm is performed at step C10, and it shifts to processing of degree Rhine whether the boundary count xp is the same as the boundary point size xpm, and by becoming large.
[0115] Drawing 9 is the flow chart of the Rhine transfer including alpha blending.
[0116] Drawing 10 is an example of the display screen including alpha blending. It is the memory map [in / drawing 10 (A), and / in (B) / line number L] of usual Rhine memory and the Rhine memory for alpha blending. [the example of a display screen of alpha blending]
[0117] As line number L displayed on a degree in line number L of drawing 10 , alpha blending line transfer on the line number is explained below.
[0118] the boundary point of each indicative datas on line number L in which the display processor 121 has alpha blending in step D1, and a point size -- computing .
[0119] One boundary point size is increasing rather than the example of the usual display screen of drawing 8 . This boundary point and point size are computed by the upper right coordinate of each indicative data which was transmitted on data memory 120 and obtained, a lower left coordinate, the direction coordinate size of X, the direction coordinate size of Y, the priority, etc.
[0120] Or the data computed beforehand are transmitted to data memory 120 by Maine CPU 111, and you may acquire only by referring to data memory 120.
[0121] The boundary point on line number L is xpt[0] =xs0, xpt[1] =xs1, xs2 and xpt[2] =xpt[3] = (xe 1+1), and xpt[4] = (xe 2+1) and xpt [5] = (xe 0+1).
The next door boundary point size xpm is set to 6.
[0122] Since it is usually the same as the Rhine transfer, the boundary without alpha blending explains the time of the boundary counter xp with alpha blending.
[0123] The left boundary point xpl on Rhine L acquired by step D14 is xpr=xpt[3] = (xe 1+1) by acquisition of the right boundary point xpr are xpl=xpr=xpt[2] =xs2 and according to step D4.
It becomes.
[0124] window 1 data-storage start-address addr equivalent to line number L which is this indicative data -- addr=win1_addr+(xe1-xs 1+1) *(L-ys1)+ (xs2-xs1) -- ** -- it is computed (step D5).
[0125] Line number L judges even number or odd number at step D6, and changes data transfer (step D7) to Rhine memory 116a, or data transfer (step D8) to Rhine memory 116b.
[0126] Since display rectangles are xpl and (xpr-1), the data transfer size to Rhine memory 116a or Rhine memory 116b serves as xpr-xpl.
[0127] Since the write-in location to Rhine memory 116a or Rhine memory 116b is xpl, the data transfer to Rhine memory 116a or Rhine memory 116b will transmit the data of ((xe1+1)-xs2) to xs2 of Rhine memory 116a or Rhine memory 116b from addr.
[0128] It judges whether there are any another data carried out alpha blending to the data at step D9 after data transfer termination.
[0129] Window 2 even-number data storage start-address addr equivalent to line number L which a window 1 and a window 2 are alpha blending here, and is this indicative data is addr=win2e_addr+(xe2-xs 2+1) * (L-ys2).
It is computed (step D10).
[0130] Line number L judges even number or odd number at step D11, and changes data transfer (step D12) to Rhine memory 116c, or Rhine memory 116d data transfer (step D13).
[0131] Rhine memory 116c at this time or Rhine memory 116d is the Rhine memory for alpha blending. Since display rectangles are xpl and (xpr-1), data transfer size (Rhine memory 116c or Rhine memory 116d) serves as xpr-xpl.

[0132] Since a write-in location (Rhine memory 116c or Rhine memory 116d) is xpl, data transfer (Rhine memory 116c or Rhine memory 116d) will transmit the data of ((xe1+1)-xs2) to Rhine memory 116c or Rhine memory 116d xs2 from addr.
[0133] Usually, it can have separately data which use as the Rhine memory for alpha blending the data which are not carried out alpha blending alpha blending in the Rhine memory, and it becomes possible to perform a synthetic display by alpha blending processing of hardware.
[0134] Step D14 and step D15 which are subsequent processings are usually the Rhine transfer.
[0135] The display of cursor can be displayed by the operations sequence indicated above, and after transmitting the above-mentioned indicative data for one line to the Rhine memory, the coordinate of cursor, the direction size of cursor X, the size of the direction of cursor Y, cursor data storage start-address curs_addr, etc. are given, and it can realize also by making the last give a synthetic indication.
[0136] When displaying on the data of alpha blending, it is writing in both the usual Rhine memory and the Rhine memory for alpha blending, and cursor can be displayed.
[0137] By this approach, cursor always serves as the top priority and can carry out processing speed early.
[0138] The above is explanation of basic actuation of the display processor 121.
[0139] Next, other actuation which the display processor 121 performs is explained.
[0140] Processing of zooming and a skip of an indicative data is explained first. As shown in drawing 3 , the display processor 121 has 2 sets of buffer memory for a transfer in the interior.
[0141] After the indicative data read from main memory 21 is first stored in the buffer memory 125a and 125b for the 1st set of transfers and then is stored in 1 more set of buffer memory 1126a and 126b for a transfer, it is stored in the Rhine memory 116 for a display.
[0142] Read-out and the writing between this buffer memory for a transfer are finely controllable by the program given to the display processor 121.
[0143] concrete -- the 1st set of stops of the read-out counter of the buffer memory 125a and 125b (it is called read-out memory) for a transfer -- the writing to the stop of the write-in counter to the buffer memory 1126a and 126b (it is called write-in memory) for a transfer of a lot and write-in memory already carries out -- it can /carry out and **** can be performed per pixel in the location of arbitration.
[0144] It can be made to change to the indicative data which made by this the expression (it is called the skip) and them to which it seems that the image expansion of a display image, contraction, and on the right of a certain location shifted rightward, and the hole opened in the image intermingled.
[0145] Actuation of zooming and a skip is controlled by CDC shown in drawing 11 .
[0146] CDC has 2 bits [per pixel] information, and the buffer memory 125a, 125b, and 126a for a transfer, the read-out counter between 126b, a write-in counter, and writing carry out it per pixel -- it /carries out and **** is controlled.
[0147] It is the transfer operation between the buffer memory for a transfer at the time of twice not to perform zooming and a skip etc., and drawing 12 continues giving "00" as CDC in this case.
[0148] Then, the read-out counter and the write-in counter are counted up every [1], and the same data as read-out memory write it in, it is written in memory, and serves as a transfer of actual size.
[0149] When reducing, the data corresponding to the pixel which wants to exclude CDC are set to "01." In drawing 13 which shows contraction actuation, although an indicative data is written in write-in memory in order to 0, 1, 2, and 3, since CDC of the location of 3 is "01", a write-in counter stops and then overwrite of 4 is carried out to the location of 3.
[0150] An indicative data contracts by 1 pixel now. If the rate of reducing the horizontal direction of an image to one half, and setting up "01" partially if "01" is set as CDC at intervals of a pixel is changed, an image will become a cylindrical shape, for example.
[0151] In expanding, it sets "10" as the location where CDC corresponds.
[0152] In drawing 14 , although an indicative data is written in write-in memory in order to 0, 1, 2, and 3, since CDC of the location of 3 is "10", a read-out counter stops and then 3 is written next to 3 once again. Expansion for 1 pixel is performed now.
[0153] It is a skip when CDC is "11." Although 0, 1, and 2 are written as they are in this drawing, since

CDC of the location of 3 is "11", the read-out address stops. For this reason, the indicative data of 3 will be written to a pixel on the right.
[0154] Furthermore it writes in, and the writing to memory is not performed, but nothing is written to the location of 3 of write-in memory. The skip for 1 pixel is performed now.
[0155] By the way, although it is common for the rate of zooming to be horizontally fixed, CDC serves as a repeat of the same pattern in this case. In this example, zooming etc. can be specified by little data by setting up the point repeatedly with the pattern to repeat compared with writing in CDC for 1 level Rhine.
[0156] For example, in reducing by 0.75 times, CDC serves as a repeat of "00", "00", "00", and "01" like drawing 15 . In this case, by setting up the point repeatedly so that a repeat may be performed per this CDC for 4 pixels, and 4 pixels, the same CDC is used repeatedly and contraction actuation is performed.

[0157] Drawing 16 is the case where it expands by 1.75 times, similarly.
[0158] Next, the mixed ratio (for example, a window 1 and a window 2) of alpha blending section is explained about arbitration and a means to make it change continuously, among this inventions. As for whether the mixed ratio of alpha blending of the window 1 of the above-mentioned example and a window 2 specifies or changes a mixed ratio continuously, Maine CPU 111 publishes a command to the display processor 121.
[0159] The display processor 121 reads the mixed ratio data beforehand stored in program memory 119 corresponding to the command from Maine CPU. Mixed ratio data are outputted to the sum-of-products arithmetic circuits 127f and 127g.
[0160] On the other hand, the display processor 121 reads the Rhine memory 116a, 116b, 116c, and 116d of the data with which the display rectangle of alpha blending was stored from explanation of the example of a display including the above-mentioned alpha blending, and transmits it to the sum-of-products arithmetic circuits 127f and 127g.
[0161] the sum-of-products arithmetic circuits 127f and 127g -- the data of the Rhine memory 116a and 116b, alpha blending line memory 116c and 116d, and a mixing ratio -- sum-of-products data processing is performed about alpha blending display rectangle by rate data, and mixture of a window 1 and a window 2 is changed.
[0162] Otherwise, some methods of setting up the mixed ratio of two screens with alpha blending are considered.
[0163] One prepares the dedicated register which stores a mixed ratio, and alpha blending, when carrying out, it is the approach of reading a mixed ratio from the register. In that case, whenever a mixed ratio changes, the display processor 121 needs to rewrite the contents of the register.
[0164] In case LUT which stores two or more mixed ratios in others is prepared and an indicative data is written in the Rhine memory, there is the approach of writing the call address of the LUT in the Rhine memory per pixel together.
[0165] Next, although it has two video inputs in this example, the display processor 121 can incorporate video image data from this. After A/D conversion of the video video signal is carried out, it is stored in the Rhine memory for a video input.
[0166] The Rhine memory for a video input uses the memory which performs read-out and writing as well as those with two per video input, and other Rhine memory, changing it by turns.
[0167] After the video data written in the Rhine memory for a video input is read by the processor 121 for a display and performs zooming, skip processing, etc. within the display processor 121, it is transmitted to main memory 116.
[0168] Next, the data-processing circuit 113 is explained. The indicative data stored in main memory 112 is stored not only in the data of the usual RGB format but in various data format.
[0169] While an indicative data is read from main memory 112 by the display processor 121 and being written in the Rhine memory 116, there are YUV decoder 127a, run length expansion circuit 127b, color expanding circuit 127c, and a processing circuit of color palettes 127d and 127e, and the indicative data of various data format is changed into a RGB format there, and it is stored in the Rhine memory 116.

[0170] The display processor 121 specifies by which data-processing circuit it changes as the pixel unit selector 128, and it makes it choose. The pallet which can have two or more color palettes, for example, is used for every window is changeable.
[0171] Furthermore, it can respond to a format of various indicative datas by adding other data-processing circuits.
[0172] Although the indicative data which passed through the data-processing circuit 113 is written in the Rhine memory 116, some values can be set up as write-through data which are not displayed in fact among indicative datas.
[0173] If there are write-through data in case the display processor 121 transmits an indicative data to the Rhine memory 116 from main memory 112 or a data buffer 115, the writing to the Rhine memory 116 will not be performed about the pixel.
[0174] This is effective in the display of the image which is not a rectangle, for example, a mouse cursor etc.
[0175] Next, the actuation which performs a screen display using use Rhine information is explained. Usually, the Rhine memory for a display operates by 2 lots.
[0176] This is because it cannot access by the display processor 121 writing in to the Rhine memory which is reading for the display, and the indicative data of next Rhine writes it to different from the Rhine memory which is reading another Rhine memory, and it performs ****.
[0177] The Rhine memory which performs this reading and writing whenever Rhine to display changes is replaced by turns, and the display is advanced.
[0178] However, when not displaying especially a background by the case where two or more screens are compounded and displayed as shown in drawing 4 (B) and (C), the indicative data of front Rhine may remain having performed the writing of the indicative data to the Rhine memory only about the part which displays a window, and remaining in other parts. Therefore, the clearance of the Rhine memory is needed before writing, and the time amount for it is needed.
[0179] Use Rhine information does the clear activity of this Rhine memory unnecessary.
[0180] Use Rhine information is the information showing whether it is data with which it corresponds to the indicative data of each pixel on the Rhine memory by 1 to 1, and the indicative data is used by the display of the how many lines.
[0181] The use Rhine information corresponding to 1 pixel of indicative datas is only several several pixel minute [as an indicative data / when it is the same in each Rhine memory], i.e., level pixel, minutes above the number of bits (it will be 11 bits if a screen size becomes 1280x1024) which can express (+one pixel of the perpendicular direction of a screen).
[0182]
[Effect of the Invention] Since according to this invention the mixed ratio of the field where a window 1 and windows 2 overlap is changed when displaying 2 screen window on coincidence, even if it displays a window 1 and a window 2 on coincidence greatly, the information on the image of a required window is not missing.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] In the image display device which has at least two or more alignment systems At least two or more alignment systems for carrying out coincidence reception of the picture signal from the source of two or more signals, and one alignment system Signal contraction / expanding means which reduces / elongates each video signal in order to consider as the alignment system for the Maine screens, to use other alignment systems as the alignment system for sub screens and to display two or more images on a scope at coincidence, With the signal mixing means and said mixing means for superimposing all or a part and displaying the video signal from the alignment system for the Maine screens, and the video signal from the alignment system for sub screens As opposed to the field of the video signal for [which is superimposed and displayed] having been detected by a detection means to detect the field of the video signal on which it was superimposed, and said detection means A means to set up whether the mixed ratio which was able to decide beforehand the mixed ratio of the video signal on which it superimposes each other to be a setting means to set up whether which video signal is carried out up and down, and the mixed ratio of arbitration is set up, or it carries out continuously and displays, The image display device characterized by having the display which projects two or more video signals controlled by said display processor.
[Claim 2] In the image display device which has at least two or more alignment systems At least two or more alignment systems for carrying out coincidence reception of the picture signal from the source of two or more signals, and one alignment system Signal contraction / expanding means which reduces / elongates each video signal in order to consider as the alignment system for the Maine screens, to use other alignment systems as the alignment system for sub screens and to display two or more images on a scope at coincidence, With the signal mixing means and said mixing means for superimposing all or a part and displaying the video signal from the alignment system for the Maine screens, and the video signal from the alignment system for sub screens As opposed to the field of the video signal for [which is superimposed and displayed] having been detected by a detection means to detect the field of the video signal on which it was superimposed, and said detection means A means to set up whether the mixed ratio which was able to decide beforehand the mixed ratio of the video signal on which it superimposes each other to be a setting means to set up whether which video signal is carried out up and down, and the mixed ratio of arbitration is set up, or it carries out continuously and displays, The means which writes the call address in the Rhine memory by ****** together in case an indicative data is written in the Rhine memory, Or the image display device characterized by having the display which projects two or more video signals which were supplied from the means which writes a direct mixing ratio in the Rhine memory per pixel, and said write-in means, and were controlled by said display processor.

[Translation done.]

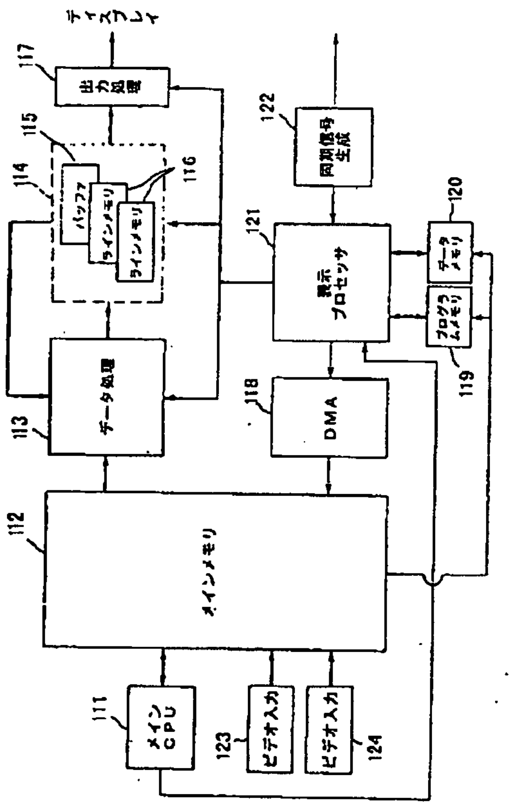
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing 1 operation gestalt of the screen-display equipment concerning this invention.
[Drawing 2] It is the block diagram showing the data-processing circuit and the display memory section of this screen-display equipment.
[Drawing 3] It is the block diagram showing the display processor of this screen-display equipment.
[Drawing 4] (A) - (C) is drawing showing the indicative data of main memory, and the display output of a display.
[Drawing 5] It is the memory map of main memory with which various indicative datas are stored.
[Drawing 6] It is the flow chart which gives a synthetic indication of two or more windows.
[Drawing 7] It is the flow chart of the usual Rhine transfer without alpha blending.
[Drawing 8] It is the memory map of the Rhine memory [in / (A), and / in (B) / line number L]. [the example of the display screen without alpha blending]
[Drawing 9] It is the flow chart of the Rhine transfer including alpha blending.
[Drawing 10] It is the memory map [in / (A), and / in (B) / line number L] of usual Rhine memory and the Rhine memory for alpha blending. [the example of a display screen of alpha blending]
[Drawing 11] It is the explanatory view showing the activity of CDC.
[Drawing 12] It is a buffer transfer operation explanatory view when not performing zooming and a skip.
[Drawing 13] It is the explanatory view showing contraction actuation of the buffer memory for a transfer.
[Drawing 14] It is the explanatory view showing expansion actuation of the buffer memory for a transfer.
[Drawing 15] It is an explanatory view of operation in the case of reducing by 0.75 times.
[Drawing 16] It is an explanatory view of operation in the case of expanding by 1.75 times.
[Drawing 17] It is the block diagram showing an example of the conventional image display device.
[Drawing 18] It is the block diagram showing the system unit of a base technique.
[Description of Notations]
111 Maine CPU
112 Main Memory
113 Data Processing
114 Display Memory Section
115 Buffer
116 Rhine Memory
117 Output Processing
118 DMA
119 Program Memory
120 Data Memory

121 Display Processor
122 Synchronizing Signal Generation
123,124 Video input

[Translation done.]

Drawing selection Representative drawing



[Translation done.]